IN THE U.S. PATENT AND TRADEMARK OFFICE

In re Application of: Karen Ann SHEPPARD et al.	Before the Examiner: Sheeba AHMED
Serial No.: 09/714,332	Group Art Unit No.: 1773
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Title: Improved Lamination Grade Coextruded Heat-Sealable Film	Date: June 3, 2003

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DECLARATION UNDER 37 CFR § 1.131

1. We, Karen Ann Sheppard and Robert A. Migliorini, declare as follows:

2. We are inventors in the patent application identified above and have personal knowledge of the facts recited below.

3. Prior to June 13, 2000, we prepared the "Information for Patent Consideration" document attached as Exhibit A. This Information for Patent Consideration document led to the filing of the above-identified patent application.

4. The Information for Patent Consideration document shows three layer heat sealable lamination grade coextruded structures.

5. The Information for Patent Consideration document also shows the inclusion of cavitating agents in the core layer of the heat-sealable films.

6. The events discussed above all took place in the United States.

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the Application or any patent issued thereon.

Date: 6/4/03

Karen Ann Sheppard
Karen Ann Sheppard

Date: 6/9/03

Robert A. Migliorini
Robert A. Migliorini

EXHIBIT A

INFORMATION FOR PATENT CONSIDERATION
MOBIL CHEMICAL CO. FILMS DIVISION

DESCRIPTIVE TITLE
Improved Lamination Grade Coextruded Heat-Sealable OPP Films

SUBMITTED BY
Robert Migliorini, Karen Sheppard

DESCRIPTION OF CONCEPT

A. Nature of Concept

The concept entails an improved design(s) for producing lamination grade coex heat sealable type OPP films with excellent slip and machinability performance. Unmodified polypropylene film with heat sealable skin layers has inherently high coefficient of friction (COF) and film-to-film blocking properties. Therefore, slip additives and antiblocking particulates are traditionally added to the film structure to lower the COF and provide improved machinability to produce packages for food, etc. Traditionally, the slip properties of polypropylene film have been beneficially modified by the inclusion of polymer of fatty acid amides, such as, erucamide or oleamide. However, the disadvantage with these fatty amide materials is their dependence on film temperature and storage time to promote the migration and effectiveness of this type of slip system. Fatty amide slip systems also have reduced functionality when the film is laminated to other non-slip containing films and consequently, the COF increases after lamination. Therefore, the production and functionality of fatty amide slip systems is limited.

Improved COF and slip functionality can also be gained by the incorporation of silicone oil into the skin layer of multilayered OPP films. Immediately upon winding a film with one skin layer containing silicone oil, the opposite side of the film structure is lubricated. Therefore, there are no manufacturing issues or delay in obtaining an OPP film with excellent slip performance on both sides. Films containing an appropriate concentration of silicone oil also perform well in lamination on packaging machines and maintain a low COF. However, the disadvantage with silicone oil slip systems is the difficulty in converting these types of films. Due to the silicone oil lubrication on both sides of the film, the treated surface becomes contaminated and consequently makes printing and ink adhesion more difficult. Additionally, if printing and laminating are done in two steps (out-of-line), then silicone oil can also transfer to the surface of the ink and cause future lamination bonding strengths to be low or inconsistent.

The concept of this invention is to utilize an ultra-high molecular weight silicone gum slip system to lubricate the untreated skin layer and reduce the transfer of silicone upon winding. Due to the increased viscosity of the silicone gum, the lubricating functionality is also reduced in comparison to silicone oil. However, utilizing higher concentrations of silicone gum in combination with additional antiblock particles, enable reduced COF and improved slip performance to be obtained. The machinability on typical packaging machines is excellent when films containing silicone gum and additional antiblock additives are laminated and evaluated. The key advantage when using the higher viscosity silicone gum is that the converting performances are improved due to the reduction in transfer tendency. Both the ink adhesion and lamination bond strengths are excellent with films containing silicone gum.

Utilizing silicone gum in combination with functional antiblocking agents, such as, Epostar PMMA organic antiblock and/or Tospearl cross-linked polymonoalkylsilioxane antiblock provides an excellent surface modification for improved COF and machinability. Typical concentrations of these slip-modifying additives are in the range of 1 – 2% silic ne gum (or 2 – 4% of Dow C rning's MB50-001 masterbatch), and 0.075 – 0.30% of both Epostar and Tospearl. The average antiblock particle size can vary, but is m st typically in the

EXHIBIT A (C nt'd.)

range of 1 – 5 micr ns, and preferably 2-3 micr ns. Th se slip additives are most commonly added to a broad seal range untreated skin layer. This skin layer requires heat sealability and excellent slip machinability performance. Any known low temperature sealant resin can be used, such as, EPB terpolymers, EP random copolymers, PB copolymers, metallocene-catalyzed polyethylenes, etc. The opposite treated skin layer can also contain slip enhancing antiblock particulates as well. Either organic or inorganic antiblock additives with an average particle size in the range of 1 – 5 microns can be used. The core layer contains typical isotactic polypropylene homopolymer. Optionally natural or synthetic type terpenes/hydrocarbons can be incorporated into the core to improve barrier (water vapor, oxygen, etc.), and in particular water vapor barrier as needed. Optionally a suitable cavitating agent (polybutylene terephalate, calcium carbonate) can be included in the core layer to form a white opaque lamination grade coextruded heat sealable OPP film.

In many cases, antistatic agents are also added to the core of heat sealable coex films in order to prevent static or cling. However, these migrating types of additives can also cause problems during converting, such as build-up on laminator presses or ink adhesion issues. Therefore, the proposed film design does not contain any antistatic additives to prevent or eliminate any associated converting issues.

An example of a typical 3-layer heat sealable lamination grade coextruded structure exhibiting this concept with some representative polyolefins and slip additives is shown below. The skin layers can also be made of a reduced width, while only the PP homopolymer core is maintained at the full width. The surface layer for lamination or printing is surface treated via flame or corona treatment. For the case of an EVOH laminating/print surface layer, surface treatment is not necessary and a suitable tie layer (ex. maleic anhydride grafted polypropylene) is necessary between the print/laminating skin and the core layer to achieve adequate skin adhesion. The EVOH laminating/print surface layer further enhances the oxygen barrier and flavor/aroma barrier properties of the film. The film below can also be optionally two side sealable depending upon the selection of the polymer used for the treated skin layer.

Treated

Laminating and/or Print Layer *Resins:* PP homopolymer, EP block copolymer, HDPE, EVOH copolymer, EP random copolymer, PB copolymer, EPB terpolymer, MDPE, LLDPE, EVA, EMA or blends of above *Additives:* Antiblock – inorganic or organic particles *Layer Thickness:* 0.5-2.0 micron thickness
Isotactic PP homopolymer (5-50 micron thickness) w/optional addition of natural or synthetic hydrocarbon additives and/or cavitating agent
Heat Sealable Layer *Resins:* EP random copolymer, PB copolymer, EPB terpolymer, LLDPE, LDPE, EVA, EMA, Surlyn ionomer or blends of above *Additives:* Silicone Gum + Antiblock (organic or inorganic) *Layer Thickness:* 0.5-4.0 micron thickness

Untreated

Another important aspect of this invention is that we will be able to produce a single lamination grade coex film for both inside and outside web applications. Through optimization of the heat sealable layer resin type, skin thickness, antiblock type/loading, and ultra high molecular weigh silicone gum loading, we have found that a single film design can function very well as both an inside and an outside web in a lamination. This is not currently achievable with our current lamination grade product line as SPW-L is used predominately for outside web applications and SPW is used predominately for inside web applications.

EXHIBIT A (Cont'd.)

B. Possible Novelty

The novelty is that it will be possible to produce a new generation of lamination grade coextruded OPP films with improved fitness-for-use properties with this concept, which were not achievable with current coextrusion technology and additive formulations. Utilizing ultra-high molecular weight silicone gum instead f silicone oil or fatty amide slip systems enable lamination grade coex heat sealable films to be produced:

- without migrating additives that require aging after production,
- with excellent COF, hot slip, and machinability, even post-printing and laminating,
- with excellent ink adhesion and bond strengths in lamination.
- with one film design that functions well in both inside and outside web applications

C. Data and Other Pertinent Information

The work originated with the development of a new coex film, which was to have a broad sealing range and excellent slip characteristics, while maintaining the capability to produce such a film structure on sequential tenter BOPP equipment. The investigation included evaluating new slip and antiblock additives and optimizing the film formulation in order to achieve the delicate balance between FFM and FFU.

The film structure design proposed is comprised of 3 layers, including a homopolymer polypropylene or copolymer core layer (B), an outer treated skin layer (A) and an untreated sealable layer (C). The treated skin layer would be either flame or corona treated for future converting steps. The structure design is shown below:

Treated

Treated Skin – HDPE, PP homopolymer, EP random copolymer, etc. @ 0.5 microns – 2.0 microns	A
Isotactic PP homopolymer (5-50 micron thickness)	B
Untreated Sealant Skin – EPB terpolymer, EP random copolymer, PB copolymer, etc. @ 0.5 microns – 4 microns	C

Untreated

The film property data generated during semiworks trials completed in March and September 1999 are shown below. The data generated from these experiments show that when silicone gum is utilized in combination with Tospearl, Epostar, or both antiblocks, the film properties and performance are optimized. Hence, both the COF and the hot slip results are low (lower the better) and the convertability is improved, while still maintaining excellent machinability on the packaging machines. From the table below, it can be seen that when the slip system utilized is silicone oil, that all the FFU properties are very good except for the ink adhesion and lamination bonds. With reduced levels of silicone oil in combination with Epostar antiblock, the machinability is negatively impacted. In the case with Erucamide, all the FFU properties are very good except for the inconsistency in machinability due to increases in COF through converting. The example below without any type of slip system is not fit-for-use in terms of its COF and machinability performance, but does have improved convertability. Therefore, in order to achieve fit-for-use film properties, good convertability, and excellent machinability performance, silicone gum can be utilized in combination with antiblock. Either Tospearl, Epostar, or both antiblocks could be used in conjunction with silicone gum to achieve the desired results. The appropriate concentrations and particle sizes of each additive in this proposed film design are dependent on the untreated sealant skin layer thickness. The sealant layer thickness can be adjusted in order to produce films with varying sealability or minimum sealing temperatures (MST).

EXHIBIT A (Cont'd.)

All formulations below were evaluated using EPB terpolymer base resin and 1.0 micron skin thickness of the untreated sealant skin (lay r C):

Slip Additive (%)	Antiblocks (%)	COF Trt/Trt (kinetic)	COF Unt/Unt (kinetic)	Hot Slip U/U @275	Convertability (Ink adhesion + Lamination bonds)	Machinability
Silicone Oil (1.25%)	Syloblock (0.23%)	0.37	0.20	1.6	Inconsistent	Excellent
Silicone Oil (0.6%)	Epostar (0.4%)	0.28	0.33	1.4	Inconsistent	Marginal
Erucamide	Syloblock (0.1%)	0.30	0.30	1.2	Good	Inconsistent
Erucamide (0.4%)	Epostar (0.4%)	0.52	0.42	1.7	Good	Poor
None	Tospearl (0.3%)	0.51	0.67	1.8	Good	Poor
Silicone Gum (1%)	Tospearl (0.1%)	0.25	0.34	1.8	Good	Excellent
Silicone Gum (1%)	Epostar (0.2%)	0.25	0.31	1.5	Good	Excellent
The example below was produced with a thinner sealant skin (0.58 micron)						
Silicone Gum (1.5%)	Tospearl 0.1% and Epostar 0.1%	0.23	0.12	0.46	Good	Excellent

In addition, for the above ABC structure utilizing a print/laminating layer of HDPE (Exxon HD6704.67) at 2.3 ga units (A), a PP homopolymer core (Fina 3371) (B), and an EPB terpolymer sealant layer (Chisso XPM7790) at 2.3-2.8 ga units (C) containing 0.1% Epostar MA1002, 0.1% Tospearl T130 and 3% Dow Corning MB50-001 silicone gum masterbatch (1.5% silicone gum in sealant layer), the resulting 70 ga film functions very well for both inside and outside web applications with the print/laminating layer buried in the lamination. As an outside web, the cof and hot slip are low enough to machine well on drag back seal type of VFF&S machines with excellent lap seal range. As an inside web, the cof and hot tack are very good to machine and seal (wide crimp and lap seal range) well. Converting performance is also outstanding in terms of printability and lamination bonds and significantly improved relative to our current silicone oil containing slip system in SPW and SPW-L.

POSSIBLE SIGNIFICANCE OF TECHNOLOGY

This concept will allow us to develop and market new lamination grade coextruded heat-sealable OPP films with improved fitness-for-use (improved ink adhesion and bond strengths) and fitness-for-make (non-migrating slip system requiring no aging time or temperature) which will yield a competitive advantage for Mobil. This technology will also allow us to develop a single lamination grade coex film for both inside and outside web applications. This will allow us to rationalize our current product line (SPW-L – outer web coex, SPW – inner web coex) into a single product for both inside and outside web applications. This will result in a significant decrease in manufacturing costs due to having fewer, higher volume products.